

Correspondence.

Mr. Edison's New Force.

To the Editor of the Scientific American:

I have recently made some experiments with the so-called etheric force, the results of which will be found below.

As the subject is one which has attracted considerable attention of late, I have taken special care while making the tests, and have also carefully verified the results by repetition. You will notice that the indications tend continually in one direction, identifying the force with electricity: indeed, from what I had learned of the subject, I had little hesitation in pronouncing the phenomenon one of an entirely electrical nature. I was also led to believe that its origin was attributable solely to the induction of the battery current on itself, in the coils; but it remained to prove these conclusions correct, in order to settle the question so far as the development of a new force was concerned.

It has been stated that this force traverses with equal facility both good and bad electrical conductors, that it cannot be insulated, and that, in this particular at least, it is quite different from electricity. These statements seem strange in connection with another, which accompanies them, to the effect that manifestations have been transmitted through coils equivalent in resistance to many thousands of miles of telegraph wire. In a case of such apparent contradiction, the statements should certainly be qualified by some evidence that the manifestations traversed the wire rather than that they passed through the insulator. In any event, however, the first statements are wholly irreconcilable with the following tests, made a few days ago:

A short piece of wire was fastened to a brass ring on the end of a glass rod, the latter carefully dried. The wire was then placed in contact with the armature of a vibrator, or at least very close to it. Sparks passed readily between the wire and armature, and were plainly visible in daylight. Another brass ring was afterwards placed upon the rod, but not a single spark could be obtained from it until it almost, if not actually, touched the first. This was repeated several times, once when fifty cells of gravity battery were used to work the vibrator. Four cells were used most of the time.

The above experiment plainly indicates that the force can be insulated. The latter, however, is of a much higher tension than the battery current which produces it. When the piece of wire on the end of the glass rod is very short, sparks no longer pass between it and the vibrator. The same would be the case if an electrical machine, giving electricity of low potential, were used. But, unlike the electrical machine, the vibrating armature seems to be oppositely polarized when the circuit is opened and closed. This sufficiently explains why Mr. Edison was unable to obtain galvanometer deflections by the methods which he employed; it is also just what we might expect would result from the extra current. I was thus led to try the plan represented in the accompanying diagram, Fig. 1. One wire from the galvanometer was connected directly with the armature of the vibrator; the other led to the binding post, A. The galvanometer was therefore in connection with the battery by one of its terminals only. When the vibrator was put in motion, deflections were obtained at once. Fearful, however, that the spark was sufficient to close up the gap between the armature and B, and thus shunt the galvanometer, and that by this means part of the battery current would pass through the galvanometer and cause a deflection, I closed all of the points (see Fig. 2). This gave me a deflection of 25°, and indicated approximately what might be expected in case the spark did actually close the gap. The adjustable points were then separated, and the armature allowed to vibrate. The spot of light immediately ran up to 50° or more. By carefully regulating the points, I was enabled to get a deflection of over 400°, and could obtain it either to the right or left. The deflection in the direction of the battery current, however, was somewhat greater than the opposite one. It was evident, therefore, that the battery current did not directly produce the deflections.

A still more decided test was next made, which I am disposed to regard as conclusive. The galvanometer wires were led directly to the rings on the glass rod already mentioned. The rings were slightly separated, and each provided with a short wire, between the ends of which the armature was allowed to vibrate, striking one wire at each vibration. Fig. 3 shows the arrangement. Sparks immediately appeared on each side of the vibrator in the very slight interval which separated it from the ends of the wire, and a deflection of 300° or 400° resulted. This was always in one direction, so long as the direction of the battery current and connections remained unchanged, but passed in an opposite direction when the poles of the battery or wires leading to the galvanometer were reversed. With fifty cells of battery, the spot of light was thrown entirely off the scale.

The vibrator used in these experiments consists of an electro-magnet about two inches long, with a thin piece of

iron for the armature. The coil measured perhaps two or three ohms. Fig. 1 gives a fair idea of the instrument. The galvanometer was one of Thomson's mirror instruments, and contains something over 29,000 ohms resistance.

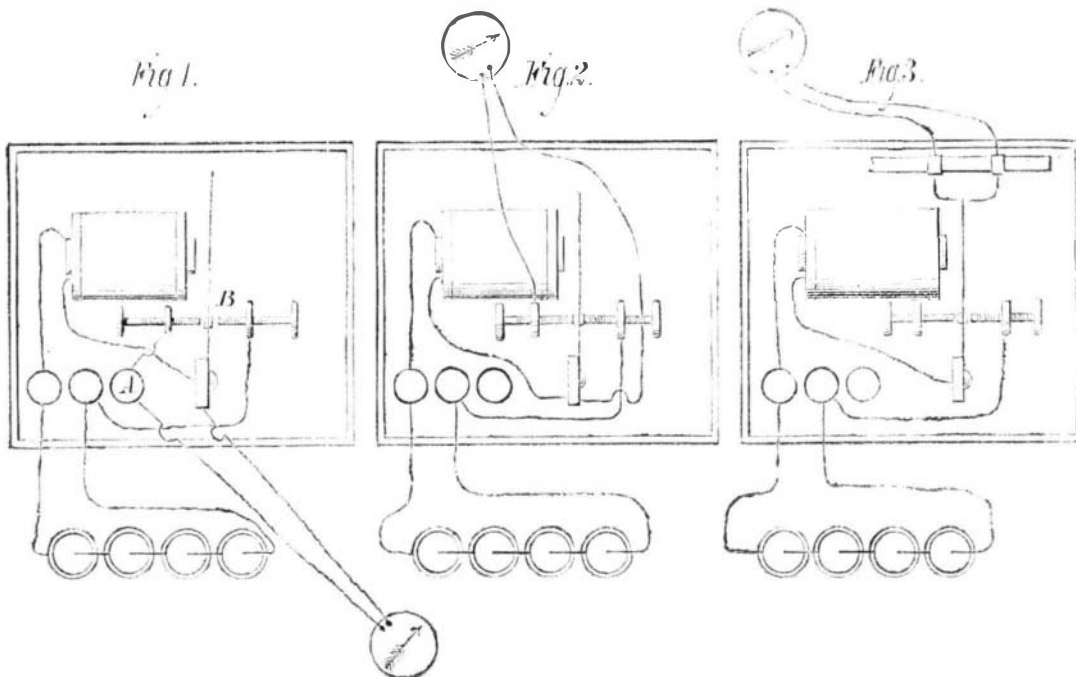
New York city.

ELECTRON.

The New Force.

To the Editor of the Scientific American:

In your paper dated January 1, you publish a letter from Thomas A. Edison, in the last clause of which he describes an "inexplicable phenomenon," namely: "An uninsulated wire, proceeding from the source of power (highly insulated), was taken into the street and laid in the gutter around a whole block and back into my laboratory by another door, and up to the floor above the one where the generator was. Excellent sparks were drawn from that end of the wire, al-



EXPERIMENTS ON THE NEW FORCE.

though the ground the wire laid on was wet, it having rained all night."

The "source of power" he speaks of, I take it for granted, means that source from which he derives what he terms the "etheric force." I see nothing inexplicable in that, as it does not conflict with the action of a current derived from the ordinary galvanic battery used for telegraphing. I have operated the relay and recording register through a naked wire, laid in sea water one quarter of a mile, as perfectly as it can be worked on an insulated air line. I then extended it to half a mile, when it worked so that I could read most of it, but the current was very weak. I then extended it to three quarters of a mile, when I could get only a slight deflection of the galvanic needle. At that distance the current did not perceptibly affect the relay. Electricity, however produced, is hard to return or bottle up. It always selects the road which has the best conductivity, without regard to distance. The relative conducting power of the uninsulated metallic wire and water will show that it requires about one mile of water to equal the better conductivity of the uninsulated wire.

I have no doubt that Mr. Edison will thoroughly ventilate his discovery, and hope that he will succeed in finding it both practicable and useful.

J. P. H.

New York city.

What is the Tail of a Comet?

To the Editor of the Scientific American:

I have not been particular to note the date when my discovery, described below, of the origin of the tails of comets was made, that discovery being only an incidental result of some other investigations; and the explanation is so absurdly simple that I have waited several years for astronomers to make the assertion that I am about to make, and which almost any person can demonstrate without need of the complex apparatus by which it was incidentally revealed to me.

Briefly: The tail of a comet is the light projected by its nucleus upon that portion of its hazy envelope which lies in the shadow cast by that nucleus when near enough to the sun to cast a shadow. The ordinary observer can prove the correctness of this statement by means of two lamps, differing only in size; while the more profound investigator can satisfy himself beyond question, through the mystery of the photometer and suitably prepared lights, the one consisting of an incandescent solid having a gaseous envelope to represent the sun, while the other or less light is of similar nature, with the addition of one or more outer envelopes exceedingly attenuated. By using suitable lamps, a multitude of spectators can be convinced of the truth of the theory on any misty or foggy night, if one lamp be moved about the other in an elliptical path; indeed the proof is so simple that I have never failed to convince the spectators by using two ordinary lamps.

Comets are originated whenever any sun, by eruption, ejects portions of its substance directly outward at a speed sufficient to overcome the attractive force of that sun's gravity. In the case of our sun, a speed of 380 miles per second is sufficient for the purpose.

The expelled mass flies outward into space, still under the

influence of the sun's gravity, as the sun is the largest near object, and all matter is subject to gravity; and as the sun's outward course changes its position, it also causes the comet's course to deviate from a straight line, because it is constantly pulled aside by the sun. This deviation continues until the comet's course becomes momentarily parallel with the sun's course, after which it gradually curves toward the sun, the entire path of its movement being an ellipse, constantly approximating to a spiral circle. The comet's fiery mass having been projected as a fragment from a body revolving upon an axis, it also has an axial motion in conformity with a universal law, which also assists to convert its bulk into a spherical shape, as its own gravity acts upon its mass to concentrate it toward its center. Thus, in time, its mass comes to consist of a fiery nucleus, with various spherical envelopes of gaseous material, more or less separated from each other by gravity. Its matter being extremely attenuated, its bulk

may be immense, while its weight is relatively small. It has an axial and an orbital motion. In this condition, it is observed by a spectator as a bright speck in space, which rapidly enlarges under continued observation as it approaches, its fiery nucleus illuminating its hazy envelope like a lamp in a globe, the whole revolving on its axis as an immense sphere of attenuated matter, perhaps 180,000,000 miles in diameter. As it approaches nearer, still revolving, it apparently increases, but less rapidly, in size; and as it gradually meets the increasing light of the sun, its own spherical glow, conquered by a superior light, gradually pales on the side nearer the sun; and it accordingly shows a tail of perhaps 90,000,000 miles (or half its diameter) in length in the solar shadow which its nucleus casts and illuminates, that being the only portion of its huge envelope which the eye is permitted to distinguish under the conquering influence of the sun's

light. When still nearer, its head and its apparent tail become more defined; and if the conditions of the comet's envelopes permit, the appearance of more than one tail may be observed: this tail, or illuminated shadow, obeying the known laws of light, being projected as nearly in a direct line from the sun: that is, it forms a slight curve, because each ray of light reaches the observer from the point of its emanation, and not from the further point which the comet occupies at the instant of observation, as the comet has moved constantly from the exact point of light emanation during the time required for the light itself to reach the observer. As the comet nears the sun, and swings around it, its apparent tail swings too, that is, the illuminated shadow swings with terrific velocity, but with no exertion of force, repulsive or otherwise, as far as the shadow is concerned; and as the comet leaves the sun, its shadow necessarily goes before it and is as necessarily illuminated as that portion of fog lying in the path of a locomotive headlight moving away from a house on fire.

As the comet flies away, its spectacular phenomena are rapidly reversed, its apparent tail fades, and the luminous glow of its sphere expands and then diminishes to a mere disappearing speck of light. When, after many circuits, its elliptical orbit gradually becomes a spiral circle, and itself becomes a planet of more or less dignity, its apparent tail disappears by absorption of its attenuated gaseous envelope, which settles on its nucleus by gravity; and its possible apparent fail becomes too short for observation. Thus the true answer to the astronomical conundrum: "What is the Tail of a Comet?" is: "It has none," and this insignificant result is a good and sufficient cause for my inactivity in heralding the fact, which was known to me at a much earlier date.

Mohawk, N. Y.

CARL MYER.

The Wreck of an Air Ship.

The Schröder air ship which, according to the inventor's claims, was going to carry fast mails between the principal cities of the country, and which subsequently would fly across the Atlantic in some incredibly short space of time, came to an unfortunate end recently. The machine, nearly finished, was carelessly left in an exposed situation overnight, on a common in Baltimore. A strong gale arising tore it from its fastening, and converted it into a useless and shapeless mass of broken boards and wicker work.

Another Explosion of Factory Dust.

The singular catastrophe which took place at the Pullman Car Works at Detroit, Mich., on November 10, 1875 (which was described on page 368 of our volume XXXIII, has been paralleled by an explosion which took place at Champion Mills, Chicago, Ill., on December 31, 1875. One of the millers was pouring some fine middlings down a chute, when the fine dust ignited on contact with the flame of a lamp which he held in his hand. A loud explosion followed, and his hands and face were terribly burnt. The building at once took fire, and property to the amount of about \$4,000 was destroyed.